One-Stop Shopping Behavior and Upstream Merger Incentives*

Vanessa von Schlippenbach† Christian Wey‡

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Abstract

We examine the merger incentives of two suppliers selling consumer goods to a common retailer. Wholesale prices are negotiated bilaterally and a share of consumers prefers one-stop shopping that induces positive demand externalities. We show that an upstream merger becomes more likely if the share of one-stop shoppers increases and retailer's bargaining power is sufficiently low. Our findings provide a new mechanism through which increasing buyer power may have adverse effects on social welfare, as buyer power makes desirable supplier mergers less likely. We also show that a retailer has incentives to take actions in favor of one-stop shoppers in order to trigger an upstream merger which is beneficial to both the retailer and consumers.

JEL Classification: *L41, L42, L22*

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†Deutsches Institut für Wirtschaftsforschung (DIW) Berlin; e-mail: vschlippenbach@diw.de.

‡University of Düsseldorf, Düsseldorf Institute for Competition Economics (DICE); e-mail: wey@dice.uni-duesseldorf.de.

1 Introduction

Time has become more and more scarce due to increasing requirements in professional life and a higher valuation of time-consuming spare-time activities. Therefore, consumers increasingly prefer to combine the purchase of different products in order to reduce the number of shopping trips or more generally their shopping time.[1] As a consequence, a one-stop shopper's buying decision depends on her expenses for her entire shopping basket rather than on individual product prices. This causes positive demand externalities between products at a single retail outlet (see Beggs 1994) such that one-stop shopping behavior affects business conduct and market performance in the retail industry. Retailers have responded to the increasing role of one-stop shopping behavior by expanding their assortments in order to allow for purchasing goods from different categories under one roof. At the same time, retail concentration has risen sharply in many countries so that buyer power of large retail chains has become a concern in competition policy (see EU 1999). The overall presumption is that retail concentration together with consumers' preferences for one-stop shopping adversely affects suppliers: More powerful retailers will squeeze suppliers who find it harder to revert to alternative retailers because of the increasing retail concentration and consumers' one-stop shopping preferences.

Against this background, we investigate how both increasing retailer buyer power and the shift in consumers' behavior towards one-stop shopping influence the supplier-retailer bargaining relationship. In particular, we examine incentives of upstream suppliers in vertically related industries as a possible way of countering the increasing buyer power of retailers. More precisely, we consider two suppliers selling their goods to a common retailer with whom they simultaneously negotiate over the wholesale price. Offering both goods in downstream markets, the retailer faces two different consumer types: single and one-stop shoppers. While the single shopper buys only one of both goods, the one-stop shopper bundles the purchase of both goods. We show that an upstream merger becomes more likely if the share of one-stop shoppers increases. This comes due to the fact that upstream suppliers internalize the positive demand externalities caused by consumers' one-stop shopping behavior when they are merged. Furthermore, we find that suppliers are better off by merging their businesses if the retailer has a sufficiently weak

[1] According to a survey of the UK Competition Commission (2000), roughly 70% of consumers reveal strong preferences for one-stop shopping.

bargaining position. However, suppliers counter the increase in the retailer's bargaining power by negotiating separately. That is, the sum of each supplier's marginal contribution is higher than the total profit due to positive demand externalities. Moreover, merger incentives are more pronounced if bargaining in intermediate good markets takes place sequentially and if the retailer has a high level of buyer power. In our setting, mergers always lead to lower wholesale prices and thus lower retail prices, which makes them always socially beneficial. This result is driven by the fact that the merged supplier internalizes the adverse pricing externalities usually associated with the pricing of complements. As a consequence, wholesale prices are decreasing. Accordingly, our results have implications for the assessment of retailer buyer power in competition policy. Increasing retailer bargaining power increases suppliers' incentives to stay independent which is clearly detrimental to welfare. Finally, we examine the retailer's strategic incentive to make one-stop shopping more attractive to consumers. The retailer can induce her suppliers to merge by favoring one-stop shoppers and thus increasing the positive demand externality. This can even result in excessive overinvestment. Interestingly, this incentive becomes larger when the retailer's bargaining power increases.

By taking the supplier-retailer relationship explicitly into the analysis, we extend the existing literature on one-stop shopping and pricing externalities. One-stop shopping has been widely explored in the marketing literature (e.g., Ingene and Ghosh, 1990, Messinger and Narasimhan, 1997, Bawa and Ghosh, 1999). In economics, Stahl (1982) is an early account of consumers' shopping behavior and the therewith-associated feature of positive demand externalities.[2] In the same vein, Beggs (1994) shows why independent retail firms are likely better off by forming a mall instead of merging to a superstore. Since independent retail firms in a mall do not take into account the effect their own prices have on the other suppliers leading to higher prices. However, if retailers merge to a common superstore, they internalize the cross-price effects and thus prices are decreasing. This makes competition more intensive. In particular when considering downstream competition. Thus the lack of coordination between independent suppliers is a commitment device for a high price level which results in higher profits. So far, the literature on one-stop shopping behavior seems to neglect the impact of pricing externalities on upstream suppliers. We also contribute to the relatively sparse literature on horizontal mergers.in

[2] For a review see Stahl (1987).

vertically related industries, whereas mainly merger incentives at the retail level are considered (e.g., von Ungern-Sternberg, 1996, Dobson and Waterson, 1997). Our paper, however, examines merger incentives at the upstream level.By this, it combines two opposing views on suppliers' merger incentives when their products are complements in a single model. Since Cournot (1838) it is well known that firms have strong incentives to merge whenever products are complements [3] In contrast, Horn and Wolinsky (1988a) show that the complementary of products gives rise to incentives to stay independent in order to extract more rents from a common retailer.[4] In our model we obtain the former result whenever consumers' preferences for one-stop shopping are relatively high and the retailer's bargaining is relatively low. If, however, the retailer's bargaining power increases we obtain the latter result of Horn and Wolinsky (1988a) such that suppliers prefer to stay independent. Showing that buyer power ambiguously affects upstream merger incentives and thus social welfare, our paper is also related to the increasing literature on buyer power. For a recent overview of this literature see Inderst and Mazzarotto (2006).

The remainder of the paper is organized as follows: In Section 2 the model is specified. The game is solved in Section 3. Merger incentives for linear contracts are examined in Section 4. In Section 5, we examine two extensions of our model; namely, retailer's investment incentives to attract more one-stop shoppers (Section 5.1) and sequential bargaining (Section 5.2). Finally, Section 6 discusses implications for competition policy and concludes.

2 The Model

We consider a vertical structure with two suppliers and one retailer R. Each supplier, S_i, produces a single product $i = 1, 2$. The retailer bears no other costs than those for buying goods from the suppliers. We suppose that the retailer's buying department bargains with each supplier separately over a wholesale w_i while it retains the right to manage the size of its ordering. Negotiations in retailer-supplier pairs proceed simultaneously. When negotiations are (successfully) completed, then the retailer sets shop prices and serves the realized demand by

[3] Sonnenschein (1968) showed that the results concerning quantity competition with perfect substitutes also hold for price competition with perfect complements.

[4] This result is also obtained in Horn and Wolinsky (1988b) for the case of competing supply chains when input prices are linear.

making corresponding orders. As we focus on the negotiation outcomes we abstract from any kind of production and distribution costs; this is, we set all marginal costs as well as fixed costs to zero.

Consumers' willingness to pay per unit of each good i is normalized to unity. We distinguish two different types of consumers: Firstly, single item shoppers (in short: single shoppers), who buy one unit of good i, and secondly, one-stop shoppers, who prefer to bundle their purchases and thus demand one unit of each good 1 and 2 per shopping trip. Both types of consumers, single shoppers and one-stop shoppers, are assumed to be uniformly distributed over the unit interval (the Hotelling line), while the retailer is located at ´the point 0. One-stop shoppers' share in total demand refers to λ and single shoppers' share to $1-\lambda$.

Consumer Demand. For each shopping trip consumers are supposed to incur shopping costs. We assume that single and one-stop shoppers incur the same cost per trip, though single shoppers buy only one good and one-stop shoppers prefer to buy both goods. We can think of a multi-person household like a classical family: One family member is responsible for shopping and thus bundles all required purchases in a single trip instead of all individual family members making purchases by their own. Given these assumptions on consumer behavior, the utility of a single shopper located at $\theta_i^s \in [0,1]$ refers to[5]

$$U_i^s(\cdot) = \begin{cases} 1 - p_i - \theta_i^s t & \text{if good } i \text{ is bought} \\ 0 & \text{otherwise,} \end{cases} \tag{1}$$

where p_i indicates the price of good i set by the retailer and t indicates the transportation costs. Correspondingly, the utility of the one-stop shopper - located at $\theta^o \in [0,1]$ - is given by

$$U^o(\cdot) = \begin{cases} 2 - \sum_{i=1}^{2} p_i - \theta^o t & \text{if goods } i \text{ and } j \text{ are bought} \\ 1 - p_i - \theta^o t & \text{if only one good } i \text{ is bought} \\ 0 & \text{otherwise,} \end{cases} \tag{2}$$

for $i = 1,2$. That is, by bundling the purchases of good 1 and 2 the one-stop shopper saves transportation costs t. Solving (1) for θ_i^s, the location for the indifferent single shopper is given by

$$\theta_i^s(p_i, t) = \frac{1-p_i}{t} \text{ if } p_i \leq 1. \tag{3}$$

[5]For simplicity, we omit the arguments of the function when it does not cause any confusion.

The single shopper demand is then

$$q_i^s\left(p_i,\cdot\right)=\begin{cases}1 & \text{if } p_i\leq 1-t\\ \theta_i^s\left(\cdot\right) & \text{if } 1>p_i\geq 1-t\\ 0 & \text{if } p_i\geq 1.\end{cases}\tag{4}$$

We get the location of the indifferent one-stop shopper as

$$\theta^o\left(p_i,p_j,t\right)=\frac{1}{t}\left(2-\sum_{i=1}^{2}p_i\right)\text{ if } p_i,p_j\leq 1.\tag{5}$$

Accordingly, for interior solution it always holds that $\theta^o\left(\cdot\right)>\theta_i^s\left(\cdot\right)$. The demand of the one-stop shopper for product i depends on the price of product j ($j\neq i$). If $p_j\leq 1$, the demand for product i is

$$q_i^o\left(p_i,p_j,\cdot\right)=\begin{cases}1 & \text{if } p_i+p_j\leq 2-t \text{ and } p_i<1\\ \theta^o\left(\cdot\right) & \text{if } 2>p_i+p_j\geq 2-t \text{ and } p_i,p_j<1\\ 0 & \text{if } p_i+p_j\geq 2 \text{ and } p_i>1,\end{cases}\tag{6}$$

with $i=1,2$ and $i\neq j$. However if $p_i\leq 1$ and $p_j\geq 1$, we get

$$\widehat{\theta}^o\left(p_i,t\right)=\frac{1-p_i}{t},\tag{7}$$

for $i,j=1,2$ and $i\neq j$. Thus, if one product of the shopping basket is not available at the retail outlet, the one-stop shopper still buys the other good included in her shopping basket. If $p_j>1$, the demand of the one-stop shopper for product i is given by

$$\widehat{q}_i^o\left(p_i,\cdot\right)=\begin{cases}1 & \text{if } p_i\leq 1-t\\ \widehat{\theta}^o\left(\cdot\right) & \text{if } 1>p_i\geq 1-t\\ 0 & \text{if } p_i\geq 1.\end{cases}\tag{8}$$

Note that an increase of one-stop shoppers implies a shift of the relevant demand functions since one-stop shopping lowers consumers' transportation costs. Consequently, one-stop shopping induces positive demand externalities. For sufficiently high shopping costs or relatively high downstream prices there exist interior solutions for both the indifferent single and one-stop shopper, i.e. $\theta^o,\theta_i^s<1$. If prices or shopping costs are decreasing, the constraint of $\theta^o,\theta_i^s\leq 1$ is first binding for one-stop shoppers. That is, θ^o becomes one, while for θ_i^s interior solution still holds.

Bargaining. Before suppliers enter into bargaining with the retailer, they decide about merging their businesses. Thus, two different vertical structures have to be considered: First, the retailer negotiates with both independent suppliers simultaneously about the wholesale price, w_i. Second, the retailer enters into negotiation over both wholesale prices, w_1 and w_2, with the merged supplier. We assume for all negotiations that renegotiation is not possible. We apply the asymmetric Nash bargaining solution to solve for the wholesale prices. For that purpose we have to specify the payoffs in case of agreement and disagreement. If no agreement is reached with one supplier i, then the retailer can still sell the other product j to final consumers which gives rise to the profit $\widehat{\pi}_j(\cdot)$. Suppliers have no alternative to selling their products through the retailer, since the retailer is considered as a local gatekeeper to final consumer markets. Hence, we assume that suppliers' disagreement payoff is always zero. Considering first separate suppliers in the upstream market and taking into account the demand of all consumer types and their share in total population, retailer's profit can be written as

$$\pi(p_i, p_j, w_i, w_j, \cdot) = \sum_{i=1}^{2} (p_i - w_i) \left[\lambda q_i^o(p_i, \cdot) + (1-\lambda) q_i^s(p_i, \cdot)\right], \tag{9}$$

if both products are sold (i.e., $p_1, p_2 \leq 1$). If the retailer fails to achieve an agreement with supplier i, her profit becomes

$$\widehat{\pi}_j(p_j, w_{j,}\cdot) = (p_j - w_j) \left[\lambda \widehat{q}_j^o(p_j, \cdot) + (1-\lambda) q_j^s(p_j, \cdot)\right]. \tag{10}$$

In the case of an upstream merger, the retailer bargains with the merged supplier about the delivery of both products instead of bargaining with both suppliers separately. Accordingly, retailer's disagreement payoff is now equal to zero.

Turning to suppliers, the profit of each independent supplier i is

$$\varphi_i(w_i, \cdot) = w_i \left[\lambda q_i^o(p_i, \cdot) + (1-\lambda) q_i^s(p_i, \cdot)\right], \tag{11}$$

while the profit of a merged supplier is given by

$$\varphi^m(w_i, w_j, \cdot) = \sum_{i=1}^{2} w_i \left[\lambda q_i^o(p_i, \cdot) + (1-\lambda) q_i^s(p_i, \cdot)\right]. \tag{12}$$

Let us summarize the game to be solved as follows: In the first stage, suppliers decide whether to merge or not. In the second stage of the game, the retailer bargains either with each single supplier independently or with the merged supplier over wholesale prices. Finally, in the third stage, the retailer sets her prices in final consumer markets and consumers make their shopping decision. We solve the game by backward induction in order to find the subgame perfect equilibria.

3 Analysis

We begin our analysis by deriving the optimal retail prices p_i at the retailer's outlet for given wholesale prices and upstream supply structure. We then move backward to solve the bargaining stage in the input markets which allows us to examine suppliers' merger incentives. We limit our analysis to the case of interior solutions for $\theta^o(\cdot)$ and $\theta_i^s(\cdot)$.

In the last stage of the game, the retailer sets the prices for both products in the final consumer market. Using (9) together with (4) and (6), focusing on interior solutions for $\theta^o(\cdot)$ and $\theta_i^s(\cdot)$ and assuming $w_i, w_j \leq 1$, we obtain the optimal retail prices

$$\begin{aligned} p_i^*(w_i) &= \frac{1+w_i}{2} \text{ if } w_i \geq w^c \\ \text{with} &: \; w^c = 2(1-t) - w_j. \end{aligned} \tag{13}$$

Lemma 1. *An interior solution for single and one-stop shoppers is always ensured, if $t \geq 1$ and $w_i, w_j \leq 1$.*

Proof. Obviously, $\theta^o(\cdot) > \theta_i^s(\cdot)$. Thus, using (2) and (13), we solve for θ^o getting

$$\theta^o(\cdot) = \frac{1}{2t}(2 - w_i - w_j)$$

For an interior solution with $\theta^o(\cdot) \leq 1, t \geq (2 - w_i - w_j)/2$ has to hold. This condition is always fulfilled for all $t \geq 1$.

For reasons of simplicity, we assume in the following that $t = 1$. In stage two of the game, wholesale prices are determined according to the Nash bargaining solution, where each negotiating party gets her disagreement payoff plus a share of the joint surplus according to her exogenously given bargaining power. We denote the retailer's bargaining power by $\delta \in [0, 1]$, so that the suppliers' bargaining power is $1-\delta$. Note that we follow the route of Chen (2003) among others, where buyer power is interpreted as the ability of the retailer to initiate the bargaining process. Accordingly, a higher value of δ mirrors the larger buyer power of the retailer.

Using (9) and (10) together with (13) we obtain the reduced profit functions in the second stage of game $\pi^* \left(p_i^*(w_i), \cdot\right)$ and $\widehat{\pi}_j^* \left(p_j^*(w_i), \cdot\right)$ for the retailer. Plugging (13) into (11) and (12), the reduced profit functions of the supplier $\varphi_i^* \left(p_i^*(w_i), \cdot\right)$ and $\varphi^{m*} \left(p_i^*(w_i), \cdot\right)$ are obtained. The Nash product of each supplier-retailer pair is given by

$$N_i := \left[\pi^* (\cdot) - \widehat{\pi}_j^* (\cdot)\right]^{\delta} \varphi_i^* (\cdot)^{1-\delta}, \tag{14}$$

when suppliers are separate. Differentiating (14) with respect to w_i yields

$$(1-\delta) \left[\pi^* (\cdot) - \widehat{\pi}_j^* (\cdot)\right] \frac{\partial \varphi_i^* (\cdot)}{\partial w_i} + \delta \varphi_i^* (\cdot) \frac{\partial \pi^* (\cdot)}{\partial w_i} = 0 \tag{15}$$

for $i = 1, 2$. In the case of an upstream merger, however, the disagreement payoffs for both the retailer and the merged supplier are zero. Thus, the Nash product is given by

$$N^m := \pi^* (\cdot)^{\delta} \varphi^{m*} (\cdot)^{(1-\delta)}. \tag{16}$$

Differentiating (16) with respect to w_i, we get the first order condition

$$(1-\delta) \pi^* (\cdot) \frac{\partial \varphi^{m*} (\cdot)}{\partial w_i} + \delta \varphi^{m*} (\cdot) \frac{\partial \pi^* (\cdot)}{\partial w_i} = 0 \tag{17}$$

for $i = 1, 2$. Solving (15) and (17) respectively and imposing symmetry, we obtain the solution of the Nash bargaining problem if suppliers are separate with

$$w_i^* (\cdot) = \frac{(1-\delta)(1+\lambda)(1+2\lambda)}{2+\lambda(5-\delta+2\lambda)}.$$

With merged suppliers we get

$$w_i^{m*} (\cdot) = \frac{1-\delta}{2}.$$

Comparing $w_i^* (\cdot)$ to $w_i^{m*} (\cdot)$, we derive the following proposition.

Proposition 1 *The wholesale price w_i^* negotiated with an independent supplier always exceeds the wholesale price w_i^{m*} negotiated with a merged supplier, i.e. $w_i^* \geq w_i^{m*}$ (with equality holding for $\lambda = 0$). Furthermore, both wholesale prices are decreasing in δ, while w_i^* is increasing in λ and w_i^{m*} is independent of λ.*

Proof. See Appendix. ■

Note that without any one-stop shoppers in population and thus in the absence of positive demand externalities, i.e. $\lambda = 0$, the negotiated wholesale prices w_i^* and w_i^{m*} are equal. This implies that the joint profit of the retailer with either two separated suppliers or one single merged supplier is the same. However, if some consumers prefer one-stop shopping, i.e. $\lambda > 0$, positive demand externalities occur. The existence of these externalities relies on the agreement with both suppliers since one-stop shoppers act like single shoppers by buying only one good if the retailer fails to achieve an agreement with one supplier. In contrast to a merged supplier, independent suppliers do not internalize the externality from one-stop shopping. Hence, the sum of joint profits of each supplier-retailer pair exceeds the joint profit of the retailer and one merged supplier. As a consequence, the wholesale prices negotiated with separate suppliers are higher than those negotiated with merged suppliers, i.e. $w_i^* \geq w_i^{m*}$. This implies $p_i\left(w_i^*\right) \geq p_i\left(w_i^{m*}\right)$.

4 Merger Incentives and Social Welfare

Given suppliers' profits in the duopoly and the merged case, we are now in the position to evaluate the upstream merger incentives with

$$\Psi\left(\cdot\right) := \varphi^{m**}\left(\cdot\right) - \sum_{i=1}^{2} \varphi_i^{**}\left(\cdot\right), \tag{18}$$

where $\varphi^{m**}\left(w_i^*, \cdot\right)$ and $\varphi_i^{**}\left(w_i^*, \cdot\right)$ denote the reduced profit functions of the suppliers in the first stage of the game. We posit that suppliers merge, whenever merger incentives, $\Psi\left(\cdot\right)$, are non-negative.

With $\lambda = 0$ wholesale prices and thus profits are equal for separate and merged suppliers, i.e. $\varphi^{m**}\left(\cdot\right)\big|_{\lambda=0} = \sum_{i=1}^{2} \varphi_i^{**}\left(\cdot\right)\Big|_{\lambda=0}$. For a low share of one-stop shoppers in population, separate suppliers benefit from the higher wholesale price w_i^* compared to w_i^{m*}. However, the increase of wholesale prices w_i^* in λ intensifies the double mark-up problem in downstream markets. Hence, with a sufficiently high share of one-stop shoppers in population, the profit of a merged supplier exceeds the sum of separate suppliers' profits. That is, with increasing wholesale prices suppliers' share of the total pie is increasing, while the total pie itself is decreasing due to the strengthened double mark-up problem.

Lemma 2 *For δ sufficiently low, there exists a unique threshold value $\lambda^k\left(\delta\right)$ such that $\varphi_m^{**}\left(\lambda^k, \cdot\right) = \sum_{i=1}^{2} \varphi_i^{**}\left(\lambda^k, \cdot\right)$. Moreover, $\lambda^k(0) = 0$ and λ^k is monotonically increasing in δ.*

Proof. See Appendix. ■

Note that the retailer always benefits from an upstream merger since merged suppliers internalize the one-stop shopping externality. In order to estimate the welfare effects of an upstream merger, we define social welfare as $W(\cdot) := \Pi(\cdot) + CS(\cdot)$, where

$$CS(\cdot) = \lambda \int_0^{\theta^o(\cdot)} U^o(\cdot)\, d\theta^o + \sum_{i=1}^{2} (1-\lambda) \int_0^{\theta_i^s(\cdot)} U_i^s(\cdot)\, d\theta_i^s \tag{19}$$

denotes consumer surplus and

$$\Pi(\cdot) = \lambda \sum_{i=1}^{2} p_i q^o(\cdot) + (1-\lambda) \sum_{i=1}^{2} p_i q_i^s(\cdot) \tag{20}$$

the industry profit. An upstream merger softens the double mark-up problem such that both consumer surplus and industry profits increase after a merger. We summarize our results in the following proposition.

Proposition 3 *For all $\lambda \geq \lambda^k(\delta)$ suppliers have an incentive to merge. A supplier merger is always socially beneficial. Merger incentives are decreasing in the retailer's bargaining power δ.*

Proposition 2 reveals that suppliers' merger incentives depend on the prevalence of one-stop shopping and the retailer's bargaining power. If suppliers operate independently and consumers increasingly prefer one-stop shopping, the double mark-up problem (as already analyzed by Cournot 1838) becomes more severe. As is well-known, overcoming the double mark-up problem gives rise to strong merger incentives. However, with increasing buyer power we obtain a countervailing effect which makes it more likely that suppliers prefer to stay independent. The reason for this result is twofold: First, an increase in buyer power (i.e., higher values of δ) tends to push wholesale prices down which reduces the double mark-up problem in the case of independent suppliers. Second, if suppliers face a buyer endowed with bargaining power, then the joint surplus of independent suppliers tends to become larger compared with the surplus a single supplier can extract from the retailer. The latter effect depends on one-stop shopping preferences which imply a similar effect like product complementarity.

If buyer power is absent, one-stop shopping behavior creates merger incentives as analyzed in Gaudet and Salant (1992) and Deneckere and Davidson (1985) for the case of complementary products and in Beggs (1994) for the case of one-stop shopping. With increasing bargaining power of the retailer, the rent shifting motive becomes stronger which creates an off-setting incentive to stay apart (Horn and Wolinsky 1988a). Our model, therefore, nests those results as special cases that depend on the prevalence of one-stop shopping behavior and the retailers bargaining power.

Our analysis is likewise instructive for the assessment of the increasing buyer power of large retail chains as we obtain the following welfare result:

Proposition 4 *An increase in the retailer's buyer power from δ' to δ'' (with $\delta' < \delta''$) increases social welfare if suppliers remain merged (i.e. $\lambda \geq \lambda^k(\delta'')$) or remain separated (i.e., $\lambda < \lambda^k(\delta')$). An increase in the retailer's buyer power reduces social welfare if it triggers a separation of suppliers; i.e., if $\lambda \geq \lambda^k(\delta')$ holds before and $\lambda < \lambda^k(\delta'')$ holds after the increase in buyer power.*

Buyer tends to counter the double mark-up inefficiency by pushing the wholesale price down. Buyer power is, therefore, generally desirable. However, this reasoning is only valid if the upstream market structure does not change. If the increase in buyer power triggers a separation of suppliers, then welfare is harmed because of the inevitable increase in wholesale prices (see Proposition 1).

5 Extensions

In this section, we extent our basic model in order to explore retail investments for enhancing suppliers' merger incentives. We show that the retailer has a strategic incentive to favor one-stop shoppers because this may induce suppliers to merge their businesses. Furthermore, we check the robustness of our results vis-à-vis sequential bargaining.

5.1 Promotional Activities

In our basic model we have neglected retailer's promotion activities. In reality, however, the retailer invests in physical, ambient and social features of the in-store environment or may provide conveniences to consumers, like child care, parking facilities, and well-trained service staff (Baker et al. 2002). By these measure, the retailer creates a pleasant store atmosphere providing consumers with additional utility from shopping by itself which in turn affects consumers' decision as to how much time and money to spend in the store. But consumers benefit differently from those in-store investments or the provision of additional facilities: One-stop shoppers have a larger shopping basket and thus spend more time in the retail outlet than single shoppers. Thus, one-stop shoppers benefit particularly from an improved atmosphere at the retail outlet. If we revert to the assumption of one-stop shoppers being family shoppers, we can even assume that only one-stop shoppers benefit from child care in retail outlets.

In order to capture the retailer's incentives to invest into in-store atmosphere, we introduce an initial stage into our game. In this stage the retailer decides about the level of her in-store conveniences ν. Investment costs $c(\nu)$ are strictly convex with $c', c'' > 0$. Taking child care as an example, expenditures are supposed to provide only one-stop shoppers with an additional utility ν. Thus, one-stop shoppers' utility can be written as

$$U^o(\nu, \cdot) = \begin{cases} 2 + \nu - \sum_{i=1}^{2} p_i - \theta^o t & \text{if goods } i \text{ and } j \text{ are bought} \\ 1 - p_i - \theta^o t & \text{if only one good } i \text{ is bought} \\ 0 & \text{otherwise,} \end{cases}$$

where ν indicates the utility surplus due to the retailer's investment. Accordingly, the indifferent one-stop shopper is located at

$$\theta^o(\nu, p_i, p_{j,} \cdot) = \frac{1}{t}\left(2 + \nu - \sum_{i=1}^{2} p_i\right). \tag{21}$$

Hence, we obtain the following demand function

$$q_i^o(\nu, p_i, p_j, \cdot) = \begin{cases} 1 & \text{if } p_i \leq (2 + \nu - t)/2 \\ \theta^o(\cdot) & \text{if } (2 + \nu)/2 > p_i \geq (2 + \nu - t)/2 \\ 0 & \text{if } p_i \geq (2 + \nu)/2 \end{cases} \tag{22}$$

for the one-stop shopper. Since single shoppers are not affected by the investment, their demand still relies on (4). Accordingly, the retail profit is defined as

$$\pi(p_i, w_i, \lambda, \nu, \cdot) = \sum_{i=1}^{2} (p_i - w_i(\nu, \cdot))\left[\lambda q_i^o(\nu, \cdot) + (1 - \lambda) q_i^s(\cdot)\right] - c(\nu). \tag{23}$$

If the retailer offers only good i to final consumers, one-stop shoppers cannot purchase their whole shopping basket. This reduces their shopping time such that they become like a single shopper who does not benefit from any conveniences provided by the retailer. Thus, retailer's disagreement payoff is still defined as in (10). Supplier profits are given by

$$\varphi_i(w_i.\nu, \cdot) = w_i(\nu, \cdot)\left[\lambda q_i^o(\nu, \cdot) + (1 - \lambda) q_i^s(\cdot)\right], \tag{24}$$

if suppliers are separate, and by

$$\varphi^m (w_i.w_j, \nu, \cdot) = \sum_{i=1}^{2} w_i (\nu, \cdot) \left[\lambda q_i^o (\nu, \cdot) + (1 - \lambda) q_i^s (\cdot) \right], \tag{25}$$

if suppliers are merged. Again, we limit our analysis to the case of interior solution and symmetric prices at both the downstream as well as the upstream level.[6] Using (23) and maximizing retailer's profit function with respect to p_i, we get the equilibrium price

$$p_i^* (\nu, \cdot) = \frac{(1 + w_i)}{2} + \frac{\lambda \nu}{2 (1 + \lambda)}. \tag{26}$$

Obviously, downstream prices are increasing in ν. Turning to the bargaining stage, we apply again the Nash Bargaining Solution. Note that the costs of retailer's investment are already sunk at the moment of negotiating. Thus, the bargaining outcome relies on

$$N_i (\nu, \cdot) := \left[\pi^* (\nu, \cdot) - \widehat{\pi}_j^* (\cdot) \right]^\delta \ \varphi_i^* (\nu, \cdot)^{1-\delta}, \tag{27}$$

where $\pi^* (\nu, \cdot) := \sum_{i=1}^{2} (p_i^* (\nu, \cdot) - w_i (\nu, \cdot)) \left[\lambda q_i^o (\nu, \cdot) + (1 - \lambda) q_i^s (\cdot) \right]$ denotes the reduced profit function of the retailer and $\varphi_i^* (\nu, \cdot)$ denotes the reduced profit function of each independent supplier i. Differentiating (27) with respect to w_i, the optimal wholesale price $w_i^* (\nu, \cdot)$ is implicitly given by

$$(1 - \delta) \left[\pi^* (\nu, \cdot) - \widehat{\pi}_j^* (\cdot) \right] \ \frac{\partial \varphi_i^* (\nu, \cdot)}{\partial w_i} + \delta \ \varphi_i^* (\cdot) \ \frac{\partial \pi^* (\nu, \cdot)}{\partial w_i} = 0. \tag{28}$$

Similarly, if suppliers are merged, the Nash Product is given by

$$N^m (\nu, \cdot) := \left[\pi^* (\nu, \cdot) \right]^\delta \ \varphi^{m*} (\nu, \cdot)^{1-\delta}, \tag{29}$$

where φ^{m*} stands for the reduced profit function of a merged supplier. Differentiating (29) with respect to w_i, $w_i^{m*} (\nu, \cdot)$ is implicitly defined by

$$(1 - \delta) \left[\pi^* (\nu, \cdot) \right] \ \frac{\partial \varphi^{m*} (\nu, \cdot)}{\partial w_i} + \delta \ \varphi^{m*} (\cdot) \ \frac{\partial \pi^* (\nu, \cdot)}{\partial w_i} = 0. \tag{30}$$

Comparing (28) and (30), we get

Lemma 5 *Wholesale prices negotiated with separate suppliers exceed wholesale prices negotiated with merged suppliers, i.e.* $w_i^* (\nu, \cdot) \geq w^m (\nu, \cdot)$.

[6] Interior solution is ensured if both $\theta^o (\nu, p_i (\nu, \cdot), \cdot) < 1$ and $\theta_i^s (\nu, p_i (\nu, \cdot), \cdot) \geq 0$ hold.

Proof. See Appendix. ■

Given the optimal wholesale prices implicitly defined in (28) and (30), the reduced profit functions of the supplier are denoted as $\varphi_i^{**}\left(w_i^*, \nu^k, \cdot\right)$ and $\varphi^{m**}\left(w^{m*}, \nu^k, \cdot\right)$, respectively. Turning to suppliers' merger incentives, there exists a critical value $\nu^k(\lambda)$ implicitly defined by

$$\sum_{i=1}^{2} \varphi_i^{**}\left(w_i^*, \nu^k, \cdot\right) \equiv \varphi^{m**}\left(w^{m*}, \nu^k, \cdot\right). \tag{31}$$

This indicates that suppliers have an incentive to merge their businesses, whenever the retail investment ν is sufficiently high, *i.e.* $\nu > \nu^k(\lambda)$.

Lemma 6 *With $\nu > \nu^k$ suppliers have an incentive to merge. The critical value $\nu^k(\lambda)$ is decreasing in λ for all $\lambda \geq \widehat{\lambda}$.*

Proof. See Appendix. ■

The intuition of these results relies on the following fact: By investing ν the retailer strengthens the positive demand externality between the supplier's goods since only one-stop shoppers benefit from the investment. Accordingly, merger incentives already occur for lower values of λ. This implies that the higher the share of one-stop shoppers and thus λ, the less investment is needed in order to make the suppliers indifferent whether to merge or not.

Given the bargaining outcome in intermediate good markets and the decision of suppliers whether to merge or not, the retailer decides about her investment ν. The optimal retail investments are defined by

$$\nu^*(\lambda) := \arg\max\ \pi^{**} \begin{cases} \pi^{**}\left(w_i^*(\nu, \cdot), \nu, \cdot\right) & \nu \leq \nu^k(\lambda) \\ \pi^{**}\left(w_i^{m*}(\nu, \cdot), \nu, \cdot\right) & \nu \geq \nu^k(\lambda). \end{cases} \tag{32}$$

That is, the retailer invests $\nu^* := \min\{v^*, \nu^k\}$ if suppliers have no merger incentives, while she invests $\nu^* := \max\{\nu^*, \nu^k\}$ otherwise. For later references, we denote $\nu^{m*}(\lambda)$ as the optimal retail investment if suppliers are merged and state:

Lemma 7 *The optimal retail investment $\nu^{m*}(\lambda)$ is strictly increasing in λ.*

Proof. See Appendix. ■

The retailer may have an incentive to deviate from the investment strategies above. By exaggerating the optimal investment $\nu^*(\lambda)$, the retailer is able to force her suppliers to merge.

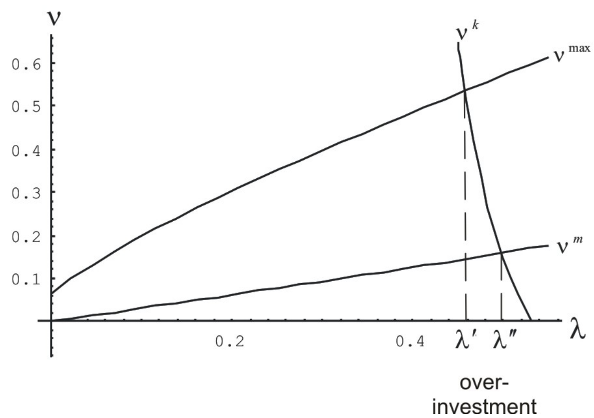

Figure 1: Overinvestment, $\delta = 0.1, t = 1$

Thus, there exists a maximal investment level $\nu^{\max}$ that is defined by

$$\pi\left(p_i^*, w_i^*, \lambda, \nu^*, \cdot\right) \equiv \pi\left(p_i^*, w_i^{m*}, \lambda, \nu^{\max}, \cdot\right), \tag{33}$$

where the retailer is indifferent of whether negotiating with both separate suppliers under optimal investment ν^* or negotiating with a merged supplier under excessive investment $\nu^{\max}$ (see Figure 1). Accordingly, we can define two critical values λ' and λ'' which are implicitly given by

$$\nu^k\left(\lambda', \cdot\right) \equiv \nu^{\max}\left(\lambda', \cdot\right) \tag{34}$$

and

$$\nu^k\left(\lambda'', \cdot\right) \equiv \nu^{m*}\left(\lambda'', \cdot\right) \tag{35}$$

implying

Proposition 8 *In the interval $[\lambda', \lambda'']$, the retailer excessively invests, i.e. $\nu = \nu^k > \nu^{m*}$, in order to induce suppliers to merge.*

Proof. See Appendix. ■

5.2 Sequential Bargaining

In this section we relax the assumption of simultaneous bargaining and assume sequential bargaining between the retailer and her suppliers. By this, we aim at exploring the impact of different negotiation structures on the bargaining outcome and finally on the merger incentives. Thus, the analysis serves as a robustness check.

Let supplier i be the first to negotiate with the retailer. Given that the bargaining outcome with supplier i is public information, the retailer negotiates subsequently with supplier j. Due to the sequential bargaining structure, it turns out that $\widetilde{w}_j^*$ is a function of $\widetilde{w}_i$, i.e. $\widetilde{w}_j\left(\widetilde{w}_i\right)$. By using backward induction we first solve for the bargaining outcome between the retailer and supplier j. The disagreement payoff of the retailer is determined by the negotiation outcome with supplier i (see 10) such that the Nash Product is given by

$$\widetilde{N}_j := \left[\pi^*\left(\cdot\right) - \widehat{\pi}_i\left(w_i, \cdot\right)\right]^{\delta} \varphi_j^*\left(\cdot\right)^{1-\delta}. \tag{36}$$

Differentiating (36) with respect to w_j, the optimal wholesale price $\widetilde{w}_j^*\left(w_i, \lambda, \cdot\right)$ is implicitly given by

$$\left(1-\delta\right)\left[\pi^*\left(\cdot\right) - \widehat{\pi}_i\left(w_i, \cdot\right)\right] \frac{\partial \varphi_j^*\left(\cdot\right)}{\partial w_j} + \delta\ \varphi_j^*\left(\cdot\right) \frac{\partial \pi^*\left(\cdot\right)}{\partial w_j} = 0. \tag{37}$$

Given this result, we turn to the negotiation between retailer and supplier i that refers to

$$\widetilde{N}_i := \left[\pi^*\left(\cdot\right) - \widehat{\pi}_j^*\left(\cdot\right)\right]^{\delta}\ \varphi_i^*\left(\cdot\right)^{1-\delta}. \tag{38}$$

Differentiating (38) with respect to w_i, the optimal wholesale price $\widetilde{w}_i^*\left(\lambda, \cdot\right)$ is given by

$$\left(1-\delta\right)\left[\pi^*\left(\cdot\right) - \widehat{\pi}_j^*\left(\cdot\right)\right] \frac{d\varphi_i^*\left(\cdot\right)}{dw_i} + \delta\varphi_i^*\left(\cdot\right) \frac{d\left[\pi^*\left(\cdot\right) - \widehat{\pi}_j^*\left(\cdot\right)\right]}{dw_i} = 0. \tag{39}$$

Looking at comparative statics for $\widetilde{w}_j^*$ in $\widetilde{w}_i^*$ and comparing (37) and (39), we get:

Lemma 9 *The wholesale price negotiated with the first supplier does always exceed the wholesale price negotiated with the second supplier, i.e.* $\widetilde{w}_i^* > \widetilde{w}_j^*$. *Furthermore,* $\widetilde{w}_j^*$ *is decreasing in* δ *and increasing in* λ.

Proof. See Appendix ■

Again, wholesale prices for both suppliers remain equal if all consumers are single shoppers, i.e. $\lambda = 0$. However, with $\lambda > 0$, we get that the first supplier i can extract more rent than the second supplier j, such that $\widetilde{w}_i^* > \widetilde{w}_j^*$. In sequential bargaining, supplier 1 can take advantage of her first mover position by increasing her own wholesale price and in turn squeezing her rival's wholesale price. Taking into account the different outcomes under both simultaneous and sequential bargaining in intermediate goods markets, we get $\widetilde{w}_i^* > w_i^* > \widetilde{w}_j^* > w^{m*}$.

Given these outcomes in intermediate good markets, we turn again to suppliers' merger incentives. Therefore, we implicitly define a critical value $\widetilde{\lambda}^k(\delta)$

$$\varphi^{m*}\left(\widetilde{\lambda}^k,\cdot\right) \equiv \sum_{i=1}^{2} \varphi_i^*\left(\widetilde{\lambda}^k,\cdot\right),$$

where suppliers are indifferent of whether to merge or not. Since $\widetilde{w}_i^* > w_i^*$ merger incentives occur at a lower level of λ than in the case of simultaneous bargaining. Summarizing our results, we get

Proposition 10 *Under sequential bargaining, merger incentives are more pronounced than under simultaneous bargaining, i.e.* $\lambda^k(\delta) > \widetilde{\lambda}^k(\delta)$.

6 Conclusion

In this paper we have shown that shopping behavior may have important implications for both the supplier-retailer relationship as well as the strategic behavior at the upstream and downstream level of a vertically related industry. If consumers prefer to bundle their purchases in order to economize their shopping time, positive demand externalities arise. Since separate suppliers do not internalize these externalities, upstream merger incentives become stronger the more consumers prefer to bundle their purchases.

However, considering the distribution of bargaining power between the retailer and her suppliers, we find that standard results concerning merger incentives and the competitive effects of mergers fail to hold. The more bargaining power the retailer has, the less likely a merger becomes at the upstream level. As has been shown by Horn and Wolinsky (1988a) for the case of complementary goods, suppliers want to counter the retailer's bargaining power by negotiating separately. Accordingly, upstream consolidation does not necessarily constitute the best response to downstream bargaining power when consumers have preferences for one-stop shopping.

We also show that upstream mergers imply lower wholesale prices such that they are always socially beneficial. Therefore, competition authorities are well advised to take a retailer's countervailing power into account when deciding about mergers between upstream suppliers. With regard to the assessment of the increasing buyer power of large retail chains, our analysis gives a rather mixed picture: For a given upstream market structure increasing buyer power tends to lower wholesale prices which is desirable both from a consumer and a social welfare perspective. However, suppliers may respond to increasing buyer power by separating their business, which raises wholesale prices and unfolds detrimental effects on consumers and overall social welfare.

Appendix

Proof of Proposition 1. For $\lambda = 0$ or $\delta = 1$, it is easy to check that wholesale prices do not depend on the supply structure. However, with $\lambda > 0$, we get that $w_i^* > w_i^{m*}$ since

$$\begin{aligned} w_i^{m*}(\cdot) \quad &\leq \quad w_i^*(\cdot) \Leftrightarrow \frac{1-\delta}{2} \leq \frac{(1-\delta)(1+\lambda)(1+2\lambda)}{2+\lambda[5-\delta+2\lambda]} \\ &\Leftrightarrow \quad \frac{(1+2\lambda+\delta)(1-\delta)\lambda}{4+2\lambda(5-\delta+2\lambda)} > 0. \end{aligned} \tag{40}$$

Turning to comparative statics, w_i^{m*} is obviously decreasing in δ and independent of λ. In turn, the comparative static of w_i^* in λ and δ is given by

$$\frac{\partial w_i^*}{\partial \lambda} = \frac{(1-\delta)\left[1+2(2-\delta)\lambda^2+4\lambda+\delta\right]}{[2+\lambda(5-\delta+2\lambda)]^2} > 0 \text{ and} \tag{41}$$

$$\frac{\partial w_i^*}{\partial \delta} = -\frac{2(1+\lambda)^3(1+2\lambda)}{[2+\lambda(5-\delta+2\lambda)]^2} < 0. \tag{42}$$

Proof of Lemma 2. Employing (18) and solving

$$\varphi^{m**}\left(\lambda^k,\cdot\right) \equiv \sum_{i=1}^{2} \varphi_i^{**}\left(\lambda^k,\cdot\right) \tag{43}$$

for $\lambda^k(\delta)$, we get

$$\lambda^k(\delta) = \frac{1-(10-\delta)\delta - \sqrt{1+\delta\left[12+\delta\left(6-20\delta+\delta^2\right)\right]}}{4(3\delta-1)}. \tag{44}$$

Setting $\delta = 0$, gives $\lambda^k(0) = 0$. Finally, taking the derivative of λ^k with respect to δ, we obtain

$$\frac{\partial \lambda^k}{\partial \delta} = \frac{9+24\delta-30\delta^2+32\delta^3-3\delta^4+[7-\delta(2-3\delta)]\psi}{4(1-3\delta)^2\psi} \tag{45}$$

with $\psi := \sqrt{1+\delta\left[12+\delta\left(6-20\delta+\delta^2\right)\right]}$. Since $\partial\lambda^k/\partial\delta$ is strictly positive for the considered parameter range, λ^k is monotonically increasing in δ.

Proof of Lemma 3. In order to prove Lemma 3, we have to show that

$$(1-\delta)\left[\pi^*(\nu,\cdot)-\widehat{\pi}_j^*(\cdot)\right]\left.\frac{\partial\varphi_i^*(\nu,\cdot)}{\partial w_i}\right|_{w_i=w_i^{m*}} + \delta\varphi_i^*(\nu,\cdot)\left.\frac{\partial\pi^*(\nu,\cdot)}{\partial w_i}\right|_{w_i=w_i^{m*}} > 0. \tag{46}$$

Assuming symmetry and using (30), we get

$$\delta\varphi_m^*(\cdot)\frac{\partial\pi^*(\nu,\cdot)}{\partial w_i} = -(1-\delta)\pi^*(\nu,\cdot)\frac{\partial\varphi^{m*}(\nu,\cdot)}{\partial w_i} \tag{47}$$

such that

$$\delta\varphi_i^*(\nu,\cdot)\left.\frac{\partial\pi^*(\nu,\cdot)}{\partial w_i}\right|_{w_i=w_i^{m*}} = -\frac{(1-\delta)}{2}\pi^*(\nu,\cdot)\left.\frac{\partial\varphi^{m*}(\nu,\cdot)}{\partial w_i}\right|_{w_i=w_i^{m*}}. \tag{48}$$

Hence, we can rewrite (46) getting

$$\left[\pi^*(\nu,\cdot)-\widehat{\pi}_j^*(\cdot)\right]\left.\frac{\partial\varphi_i^*(\nu,\cdot)}{\partial w_i}\right|_{w_i=w_i^{m*}} > \frac{1}{2}\pi^*(\nu,\cdot)\left.\frac{\partial\varphi^{m*}(\nu,\cdot)}{\partial w_i}\right|_{w_i=w_i^{m*}}. \tag{49}$$

Since $\pi^*(\cdot)-\widehat{\pi}_j^*(\cdot)\geq\pi^*(\cdot)/2$ and $\partial\varphi_i^*(\nu,\cdot)/\partial w_i$hold, inequality (49) is fulfilled and it follows that $w^*(\nu,\cdot)>w^{m*}(\nu,\cdot)$.

Proof of Lemma 4. In order to prove Lemma 4, we have to show that there exists a $\widehat{\lambda}^k(\nu,\cdot)$ that is defined by

$$\Delta\varphi\left(\widehat{\lambda}^k,\cdot\right)\equiv 0.$$

For sufficiently low δ it holds that $\Delta\varphi(\cdot)|_{\lambda=0}=0$, $\Delta\varphi(\cdot)|_{\lambda=1}>0$ and $\partial^2\Delta\varphi/\partial\lambda^2>0$. Hence, there exists a $\widehat{\lambda}^k(\nu,\delta,\cdot)\in[0,1]$ such that $\Delta\varphi\left(\widehat{\lambda}^k,\cdot\right)\equiv 0$. Accordingly, there exists a $\nu^k = 1/\widehat{\lambda}^k(\nu)$. If $\nu>\nu^k$, merger incentives are positive. However, this only holds for $\delta<\delta^k$ defined by $\widehat{\lambda}^k\left(\nu,\delta^k,\cdot\right)\equiv 1$.

Turning to comparative statics, we have to show that

$$\begin{aligned}\frac{d\nu^k}{d\lambda} &= -\frac{\partial\Delta\varphi(\cdot)/\partial\lambda}{\partial\Delta\varphi(\cdot)/\partial\nu}<0\\ \text{with }\Delta\varphi(\cdot) &:= \varphi^{m*}\left(w^{m*},\nu^k,\cdot\right)-\sum_{i=1}^{2}\varphi_i^*\left(w_i^*,\nu^k,\cdot\right).\end{aligned}$$

Note first that, using $\partial^2\Delta\varphi/\partial\lambda^2>0$ due to $w_i^*(\nu,\cdot)\geq w^m(\nu,\cdot)$ (see Lemma 3), there exists a unique $\widehat{\lambda}_1$ implicitly defined by

$$\frac{\partial\Delta\varphi(\cdot)}{\partial\lambda}\equiv 0.$$

Similarly, using $\partial\Delta\varphi/\partial\nu|_{\lambda=0}=0$ because of $w_i^*|_{\lambda=0}=w_i^{m*}|_{\lambda=0}$ and $\partial\Delta\varphi/\partial\nu|_{\lambda=1}>0$ because of $w_i^*|_{\lambda=1}=w_i^{m*}|_{\lambda=1}$we can define a $\widehat{\lambda}_2$ that is given by

$$\widehat{\lambda}_2(\nu,\cdot):=\max\left\{\lambda|\,\partial\Delta\varphi(\cdot)/\partial\nu=0\right\}.$$

Thus, we can define a $\widehat{\lambda}(\cdot)=\max\left\{\widehat{\lambda}_1,\widehat{\lambda}_2\right\}$, whereas for all $\lambda>\widehat{\lambda}(\cdot)$ it holds that $\partial\Delta\varphi(\cdot)/\partial\lambda>0$ and $\partial\Delta\varphi(\cdot)/\partial\nu>0$. Hence, $d\nu^k/d\lambda<0$ holds for all $\lambda>\widehat{\lambda}:=\max\{\widehat{\lambda}_1(\nu,\cdot),\widehat{\lambda}_2(\nu,\cdot)\}$.

Proof of Lemma 5. Solving (32) for $\nu \geq \nu^k(\lambda)$, we get

$$\nu^m = \frac{(1-\delta)\left[1+\lambda(1+\nu)\right]}{2(1+\lambda)}.$$

Differentiating ν^m with respect to λ, we get

$$\frac{\partial \nu^m}{\partial \lambda} = \frac{(1-\delta)\nu}{2(1+\lambda)^2} > 0.$$

Proof of Proposition 4. In order to prove Proposition 4, we have to show that $\widehat{\lambda}^k(\nu,\cdot) > \widehat{\lambda} := \max\{\widehat{\lambda}_1(\nu,\cdot), \widehat{\lambda}_2(\nu,\cdot)\}$. Due to the properties of $\Delta\varphi(\cdot)$, it is obvious that $\widehat{\lambda}_1(\nu,\cdot) < \widehat{\lambda}^k(\nu,\cdot)$. Turning to $\widehat{\lambda}_2(\nu,\cdot)$, we can numerically show that $sign[\partial\Delta\varphi(\cdot)/\partial\nu|_{\Delta\varphi=0}] > 0$ and therefore $\widehat{\lambda}_2(\nu,\cdot) < \widehat{\lambda}^k(\nu,\cdot)$. Thus, ν^k is strictly decreasing in λ for all $\lambda \geq \widehat{\lambda}^k(\nu,\cdot)$. Secondly, we use that ν^{m*} is increasing in λ. Since $\nu^{\max}$ is always higher than ν^{m*}, there exists an interval $[\lambda', \lambda'']$, where the retailer excessively invests.

Proof of Lemma 6. Using concavity of the Nash Bargaining Solution, i.e. $\partial^2\widetilde{N}_j/\partial w_j^2 < 0$ and $\partial^2\widetilde{N}_j/\partial w_j\partial w_i < 0$ for all $\widetilde{w}_j < \widetilde{w}^c$, we get

$$\frac{d\widetilde{w}_j^*}{d\widetilde{w}_i} = -\frac{\partial^2\widetilde{N}_j/\partial w_j\partial w_i}{\partial^2\widetilde{N}_j/\partial^2 w_j} < 0 \text{ for all } \widetilde{w}_j < \widetilde{w}^c.$$

Note that $\widetilde{w}_j < \widetilde{w}^c$ is always fulfilled in equilibrium .Turning to comparative statics in λ and δ, we differentiate (37) again with respect to δ getting $\partial^2\widetilde{N}_j/\partial w_j\partial\delta < 0$, and with respect to λ getting $\partial^2\widetilde{N}_j/\partial w_j\partial\lambda > 0$.

In order to prove $\widetilde{w}_i^* > \widetilde{w}_j^*$, we use (39) that has to be positive at $\widetilde{w}_i = \widetilde{w}_j$. Rearranging terms yields

$$\begin{aligned} & (1-\delta)\left[\pi^*(\cdot) - \widehat{\pi}_j^*(\widetilde{w}_j(1,\cdot),\cdot)\right] \left.\frac{d\varphi_i^*(\cdot)}{d\widetilde{w}_i}\right|_{\widetilde{w}_i=\widetilde{w}_j} \\ > \quad & -\delta\varphi_i^*(\cdot) \left.\frac{\partial\left[\pi^*(\cdot) - \widehat{\pi}_j^*(\widetilde{w}_j(1,\cdot),\cdot)\right]}{\partial\widetilde{w}_i}\right|_{\widetilde{w}_i=\widetilde{w}_j}. \end{aligned}$$

Using (37) and

$$\delta\varphi_i^*(\cdot) \left.\frac{\partial\left[\pi^*(\cdot) - \widehat{\pi}_j^*(\widetilde{w}_j(1,\cdot),\cdot)\right]}{\partial\widetilde{w}_i}\right|_{\widetilde{w}_i=\widetilde{w}_j} = \delta\varphi_j^*(\cdot) \left.\frac{\partial\left[\pi^*(\cdot) - \widehat{\pi}_i^*\right]}{\partial\widetilde{w}_j}\right|_{\widetilde{w}_i=\widetilde{w}_j},$$

we get

$$
\begin{aligned}
& \left[\pi^*(\cdot) - \widehat{\pi}_j^*\left(\widetilde{w}_j(1,\cdot),\cdot\right)\right] \left.\left[\frac{\partial\varphi_i^*(\cdot)}{\partial w_i} + \frac{\partial\varphi_i^*(\cdot)}{\partial\widetilde{w}_j}\frac{\partial\widetilde{w}_j}{\partial w_i}\right]\right|_{\widetilde{w}_i=\widetilde{w}_j} \\
> \; & \left[\pi^*(\cdot) - \widehat{\pi}_i(w_i,\cdot)\right]\frac{\partial\varphi_j^*(\cdot)}{\partial\widetilde{w}_j}
\end{aligned}
$$

This inequality is fulfilled since

$$
\widehat{\pi}_i(w_i,\cdot) > \widehat{\pi}_j^*\left(\widetilde{w}_j(1,\cdot),\cdot\right), \quad \left.\frac{\partial\varphi_i^*(\cdot)}{\partial w_i}\right|_{\widetilde{w}_i=\widetilde{w}_j} = \frac{\partial\varphi_j^*(\cdot)}{\partial\widetilde{w}_j} \text{ and } \frac{\partial\varphi_i^*(\cdot)}{\partial\widetilde{w}_j}, \frac{\partial\widetilde{w}_j}{\partial w_i} < 0.
$$

Thus, we get that $\widehat{\pi}_j^*(\cdot) < \widehat{\pi}_i(w_i,\cdot)$ implying that $\widetilde{w}_i^* > \widetilde{w}_j^*$.

References

Baker, J., Parasuraman, A., Grewal, D., and G.B. Voss (2002), Influence of Multiple Store Environment Cues on Perceived Merchandise Value and Patronage Intentions, Journal of Marketing 66: 120-141.

Bawa, K. and A. Ghosh (1999), A Model of Household Grocery Shopping Behavior, Marketing Letters 10: 149-160.

Beggs, A.W. (1994), Mergers and Malls, Journal of Industrial Economics 42: 419-428.

Carlson, J.A. and R.J. Gieske (1983), Price Search in a Product Market, Journal of Consumer Research 9: 357-365.

Chen, Z. (2003), Dominant Retailers and the Countervailing Power Hypothesis, Rand Journal of Economics, 34: 612-625.

Competition Commission (2000), Supermarkets: A Report on the Supply of Groceries from Multiple Stores in the United Kingdom, The Stationary Office, London, UK.

Cournot, A. (1838): Recherches sur les Principes Mathematiques de la Theorie des Richesses, Paris.

Deneckere, R. and C. Davidson (1985), Incentives to Form Coalitions with Bertrand Competition, Rand Journal of Economics 16: 473-486.

Dobson, P.W. and M. Waterson (1997), Countervailing Power and Consumer Prices, Economic Journal 107: 418-430.

European Commission (1999), Buyer Power and Its Impact on Competition in the Food Retail Distribution Sector of the European Union, Report commissioned by the European Commission, Brussels.

Horn, H. and A. Wolinsky (1988a), Bilateral Monopolies and Incentives for Merger, Rand Journal of Economics 19: 408-419.

Horn, H. and A. Wolinsky (1988b), Worker Substitutablity and Patterns of Unionization, Economic Journal 98: 484-497.

Ingene, C.A. and A. Ghosh (1990), Consumer Producer Behavior in a Multipurpose Shopping Environment, Geographical Analysis 22: 70-93.

Inderst, R. and N. Mazzarotto (2006), Buyer Power in Distribution. Chapter prepared for the ABA Antitrust Section Handbook, Issues in Competition Law and Policy (forthcoming Collins, W.D., ed.).

Messinger, P.R. and C. Narasimhan (1997), A Model of Retail Formats Based on Consumers' Economizing on Shopping Time, Marketing Science 16: 1-23.

Sonnenschein, H. (1968), The Dual of Duopoly is Complementary Monopoly: Or, Two of Cournot's Theories Are One, Journal of Political Economy 76: 316-318.

Stahl, K. (1982), Differentiated Products, Consumer Search, and Locational Oligopoly, Journal of Industrial Economics 31: 97-114.

Stahl, K. (1987), Theories of Urban Business Location, in: E.S. Mills (ed.), Handbook of Urban Economics, Vol. 2, Elsevier, Amsterdam.

von Ungern-Sternberg, T. (1996), Countervailing Power Revisited, International Journal of Industrial Organization 14: 507-520.